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ABSTRACT

A study selectively examined factors that have contributed to observed limitations of congruent data describing normative, developmental change in adult cognition. A preteritive design was used first to examine limiting factors, and secondly, to examine research strategies that could be used to provide necessary reforms of the data. Three factors were identified as being closely associated with the limited attention given by developmental neuropsychologists to normative cognitive change in adults. These were the newness and initial emphasis of the discipline, lack of interest in the topic, and preservation of the adult staticity paradigm. Of the three limitational factors, two--novelty and emphasis of neuropsychology as a discipline and level of interest--seemed to be self-correcting. The lingering issue of developmental staticity was the most enduring limiting factor identified. To combat the bias that the staticity versus change issue contributed to the literature, an amalgamated research design was recommended. Using such a design, a researcher could, from weight of the evidence arguments, extract and organize relational data statistics, using nomological analysis procedures. Subsequently, those relationships could be empirically tested via meta-analysis techniques to separate artifact effects from true independent and moderator variable effects. (YLB)

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Neuropsychological Data Relating to Normative Cognitive Change in Adults: A Selective Review of Limiting Factors and Research Strategies

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Neuropsychological Data Relating to Normative Cognitive Change in Adults: A Selective Review of Limitational Factors and Research Strategies

Introduction

An increased involvement of adults in the educational system has generated interest in their changing cognitive skills (Anderson, 1982; Rauch, 1981). Certain relationships have been consistently reported by change theorists as contributing to the developmental differentiation of cognitive abilities in adults. Those relationships include: (1) increasing age is associated with decreasing efficacy in reasoning and decision-making processes; (2) increasing age is associated with decreasing memory efficacy; (3) increasing age is associated with decreasing spatial-motor skills; and (4) increasing age is associated with decreasing speed of performance across problem solving tasks (Herrick, 1983; Lezak, 1983; Salthouse, 1982). What has not been definitively identified are the neurological correlates associated with those change parameters, if in fact the findings are generalizable. Many researchers contend they are not (Lezak, 1983).

Siegler (1977) has observed that, while there has been demonstrable neurobiological data reported as well as psychometric data, supporting cognitive change theory for adults, there have been no well defined relationships enunciated. Indeed, even the meaning of the data is not well understood. Eisdorfer (1978) found that, even though neuro-

psychology has held considerable promise for studying the relationships between biomedical and psychometric data, the field depends upon a limited body of definitive literature. This, in turn, has contributed to a paucity of congruent data describing normative, developmental change in adult cognition.

The purpose of this paper was to selectively examine factors which have contributed to the observed data limitations. A preteritive design was employed to first examine limiting factors, and, secondly, to examine research strategies which could be employed to provide necessary reforms of the data.

Limitations

Three factors were identified as being closely associated with the limited attention given by developmental neuropsychologists to normative cognitive change in adults: (1) the newness and initial emphasis of the discipline; (2) lack of interest in the topic; and (3) preservation of the adult staticity paradigm. They are addressed here in the order of their judged, contemporary importance.

As a discipline, neuropsychology's beginnings have been traced by Kolb and Whishaw (1980) to the late 1940s. However, its popularization was traceable only to the 1960s. Golden (1981; Golden and Anderson, 1979) has pointed out that developmental considerations within the newly emerging discipline have been even more recent. Thus, it is a field of study that is relatively novel.

Negatively compounding the novelty issue has been neuropsychology's overemphasis on the deficit model, and the use of psychometric batteries for the purpose of localizing deficit. Concurrent with emerging technology, however, there has begun a shift of emphasis to more productive lines of research. Hynd (1981) has observed that, in the future, subtleties of brain-behavior relationships will become increasingly better understood, via an evolving biomedical technology for the study of brain function, on the one hand, and, on the other, the increased emphasis by neuropsychologists on effecting correlative behavioral analyses. Salthouse (1982) suggested, relative to cognitive data, that as new evidence is obtained the existing theoretical models of adult processes will be disqualified as either incomplete, disconcertedly vague, or wrong. It was posited that dynamic models of difference will emerge to displace the current single, monolithic explanations of developmental change in adult cognition.

Lack of interest is, perhaps, the most rapidly fading factor of limitation. Whereas, historically, there has been an overemphasis on the neuropsychological study of the young and the aged, there is now a generative thrust of interest in the study of normative adult samples. Three major educational influences have contributed to this trend. The first is the extension of educational benefits to learning disabled, young adult populations via Public Laws 94-142 and 93-112 (Anderson, 1982). Secondly, the growing population of adults in traditional edu-

cational systems has compelled educators to refocus their emphases on programming. Rauch (1981) reported that it was not unusual for systems having programs for adults to report a larger enrollment for that population than for the K-12 population. Consequently, a third influence has emerged, constituted as a growing body of literature seeking to account for neuropsychological constructs in the delivery of adult curricula (Agor, 1983; Jones & Cooper, 1982). The cumulative impact of these factors has resulted in an unqualified interest in understanding adult cognition (Zemke & Zemke, 1982).

A third, and very important, factor of attentional limitation has been the preserveration of the adult cognition staticity paradigm. The question was--why study change if there is no change? For example, Fleishman observed in 1966 that, in adults, cognitive ability was a relatively constant behavioral variable. More recently, inferences by Williams et al. (1983) that the attributional decreased-memory/improved-problem-solving paradox was contained to elderly adult samples assumes a convenient phenomenological staticity which is unsupported by the data. Thus, staticity theory clearly persists in the face of a growing body of neuropsychological literature documenting evidence for an adult developmental change model (Gentry, 1977; Usdin & Hofling, 1978).

What, then, can account for the persisting notion of adult cognitive staticity? Salthouse (1982) suggested that the reason may be that there are those who are simply alarmed by the change model, with its

decline of function emphasis:

> . . .Some observers have become quite alarmed. . . by these types of results and have almost apologetically sought more optimistic interpretations . . .despite an absence of compelling evidence, there is an amazing amount of enthusiasm for suggestions that the reported age differences (in cognitive ability) are due simply to motivational factors, to sensory or muscular weakness, or to unspecified cohort effects. . .(p. 201).

Lezak (1983), on the other hand, suggested the staticity paradigm draws its strength from research data describing not loss in cognitive capacity with age, but, rather, skill gains instead-- sometimes reported as extending into the seventh and eigth decades. Citing Botwinick (1977), Lezak (1983) described such evidentiary phenomenon as resulting from longitudinal studies, where those observed survive because of their better health, socio-economic status, and level of activity. Those not characterized by these moderator variables do not survive, and, thus, were excluded from longitudinal study, creating by their absence a sample of "selective availability (p. 214)." Often, those espousing the staticity paradigm conveniently ignored cross-sectional data which tends to support cognitive change theory, with its corollary deficit findings. Just as often, it was pointed out, cross-sectional

researchers demonstrated tunnel vision of equal strength.

One or both of these explanations may be correct. What is certain is the persistence of the adult staticity model of cognitive ability. Clearly, it will remain a factor of contention for future research efforts.

Research Strategies

Of the three limitational factors discussed above, two--novelty and emphasis of neuropsychology as a discipline, and level of interest --seem to be self-correcting. However, it seems unlikely that the issue of staticity vs. change will easily disappear. Researchers, therefore, will be compelled to exercise caution in evaluating both the available and future experimental findings. Systematic bias on the part of researchers for either the staticity or change paradigms potentially contaminates data generation and interpretations.

Such a finding, unfortunately, is not unusual and has been frequently encountered in the restrictiveness of disciplined-based research where there has been a tendency to support specific and focused research paradigms (Hackman, 1982). By convention, meta-analysis seeks to cumulate results across studies in order to establish either the real or illusionary qualities of data relationships. Its focus is upon distinguishing between variance due to artifacts (i.e., sampling error, measurement error, range restrictions, etc.), and variance due to the

influence of independent and moderator variables.

A second methodology available for clarifying data relationships is nomological analysis (Selltiz et al., 1976). Designed to address validity issues, nomological analysis depicts on a gradation basis the extent of data relationships. Cumulatively, the greater the frequency of demonstrated relationships, and the greater the diversity of relational variables, the greater the confidence one can invest in the validity of the factor being examined.

An added benefit of nomological analysis is that it uses indices of predictive and concurrent validity. Both correlational data and percentage of agreement data, in the form of diagnostic hit rate, may be employed (Meisgeier et al., 1984). The most important feature of nomological analysis, however, is its cumulative emphasis. Therefore, modest, multiple relationship values offer more convincing evidence than do limited elevated values (Selltiz et al., 1976).

Finally, a third research strategy which may be employed is "weight of the evidence" arguments. These efforts, however, are too often cumbersome, and are often afflicted with the element of bias which the strategies discussed herein seek to eliminate. A second criticism is their lack of empirical emphasis. Thus, conclusions are hard to test with any degree of efficacy. On the other hand, the argument that scientific evidence should accrue to conclusions from a

number of studies, rather than from a single exemplary study, is compelling. An excellent example of such an argument may be found in Salthouse's (1982) treatment of adult cognition.

On balance, perhaps the most useful and complete research design to use would be an amalgamation of the three-- weight of the evidence, supported by meta- and nomological analyses. Thus, the best features of each could be exploited in examining existing data, as well as new data generated from future research efforts.

Summary

The lingering issue of developmental staticity was the most enduring limiting factor identified in the study of normative cognitive change in adults, and the factor most requiring of continued attention. The staticity vs. change issue continues to contribute systematic bias into the body of literature, clouding conclusionary findings.

To combat bias, an amalgamated research design has been recommended. Using such a design, a researcher could, from weight of the evidence arguments, extract and organize relational data statistics, using nomological analysis procedures. Subsequently, those relationships could be empirically tested via meta-analysis techniques to separate out artifact effects from true independent and moderator variable effects. Employing such a design would signal a serious effort at data integration and evaluation which would not only be useful, but timely as well.

It is important that reforms are effected. The increasing emphasis upon understanding adult educational issues highlights the correlative issue of understanding the nature of neuropsychological change in the adult years. Achieving these understandings will provide a great deal of valuable information about the nature and patterns of adult development in the years to come, as well as program needs to accomodate developmental changes.

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